

## Confocal polarimeter for the living human retina

D. Lara and C. Paterson

The Blackett Laboratory, Imperial College London, SW7 2BW, United Kingdom

**Abstract.** There is strong evidence [1] that the living human retina has polarization signatures that could be linked to the presence of Glaucoma, an ocular disease that is the second cause of blindness in the western world. In a polarization sensitive ophthalmoscope [2], the amount of light that can be used is limited for the safety of the subject, and the return is typically a small fraction of the light used for illumination, of the order of 10<sup>-6</sup>. Furthermore, the acquisition rates have to be sufficiently fast to avoid eye-movement artifacts. The light-budget available to produce a polarization image with a scanning laser ophthalmoscope is typically in the order of 10 nW [3], and pixel acquisition sampling rates are of several MHz. We are currently developing an imaging instrument for vision research and clinical vision applications and aim to introduce it to the medical and clinical environment using objective methods of image quality assessment. In this presentation we talk about the stringent imaging requirements and show an optimized design of our instrument [4].

### References

1. X. R. Huang and R. W. Knighton, *IOVS*, **46**, 4588 (2005)
2. K. M. Twietmeyer, R. A. Chipman, A. E. Elsner, Y. Zhao, and D. VanNasdale, *Opt. Express*, **16**, 21339 (2008)
3. A. E. Elsner, S. A. Burns, J. J. Weiter and F. C. Delori, *Vision Research*, **36**, 191 (1996)
4. D. Lara and C. Paterson, *Opt. Express*, **17** (2009)